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ABSTRACT

This paper examines why the Airway Science Program, initiated by the Federal Aviation Administration (FAA) to develop college-educated and technically prepared personnel for FAA employment (primarily for air traffic control), has failed to meet its work force goals. Research data were gathered from interviews with Airway Science Program coordinators at 20 of the 32 colleges and universities participating in the program. The survey found that program coordinators felt that the FAA and the University Aviation Association should be more open-minded toward the needs of the participating institutions and designate more responsibility for curriculum design to the institutions. Heavily emphasized concerns were the failure of the FAA to provide the promised number of jobs to program graduates, and the lack of adequate funding of the program and inequitable distribution of funds. The majority of coordinators felt that students preferred other academic aviation programs over the Airway Science Program, and coordinators reported more difficulty in attracting new students for the program than for other academic programs. Eight recommendations are made to improve the effectiveness of the program. Includes 16 references. (JDD)

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ABSTRACT

This paper proposes a potential means to enhance air traffic control safety through increased human performance capabilities of the nation's Air Traffic Controller Work Force. Research data was gathered from colleges and universities participating in the Federal Aviation Administration's (FAA) Airway Science Program. The Federal Aviation Administration initiated the Airway Science Program in 1983 to facilitate the development of collegiate education programs as a means of meeting future FAA manpower needs, primarily in the area of air traffic control.

The FAA realized that it must update the skill level of its work force to adapt to an increasingly technical and automated environment. This is a major undertaking in that the upgrading of this work force will require the attrition of over 45,000 individuals. Currently, 32 institutions of higher education participate in the Airway Science Program. These institutions represent many established colleges and universities which offer aviation educational programs developed by the FAA.

Research data gathered through this study should allow the Federal Aviation Administration to better understand the potential of the Airway Science Program to enhance air traffic safety. This program allows the availability of a means of pre-hire training through a baccalaureate degree program which stresses technical and managerial capabilities. This will provide an air traffic control work force with the increased human performance capabilities which are required to staff the increasingly difficult systems of our rapidly developing National Airspace System.

ABOUT THE AUTHOR

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INTRODUCTION

Air transportation has become a necessity to this nation. Safe, reliable, and efficient air transportation is a part of everyday life. Aviation has long been at the forefront of technological development. To maintain this vital position of leadership, an increasing level of technological competence is required of the practitioners in this field. Skilled aviation professionals will be the key to success in the future of aviation. They will be required to have increased technical competence to operate the increasingly difficult systems of our rapidly developing National Air Transportation System. They must also have a significant level of adaptability as our technology progresses.

The mature aviators of today would not have comprehended the ideas of jet engines, of supersonic travel, or of flights into space during their childhoods. Consequently, the young pilots of today may live to see innovations such as hypersonic transportation, e.g., a flight from New York to Tokyo in two hours or less. They may see aircraft utilizing space travel from existing types of airfields. A generation from now, airports and aircraft may be very different from those of today.

The Federal Aviation Administration (FAA) has recognized the need for highly qualified, college-educated aviation professionals for the future. With this need in mind, the FAA developed the Airway Science Program. This baccalaureate college program combines science, management, humanities, and specialty education to meet many of the needs for personnel in the future of aviation ("Careers," 1986, p. 6). As former President Ronald Reagan stated,

> Today we stand on the edge of a world in which opportunities are limited only by our own imagination. Our leadership in air and space technology, a leadership we are determined to maintain, has already provided the American people with a rich bounty that has strengthened our economy and bettered our lives.

("Careers," 1986, p. i) The Airway Science Program was designed to provide a sound base of trained professionals which will allow aviation to continue to lead in technological developments in the future. There has never been a more substantial and ambitious training program developed to meet the long-term needs of the aviation industry ("Proposed").

The Federal Aviation Administration has developed the Airway Science Program to meet the needs of the national airspace system of the future. The FAA will spend 15 billion dollars by the end of this century to modernize the air traffic control system and to develop airborne aircraft avoidance systems ("Careers," 1986, p. 4). Through the Airway Science Program, the FAA plans to update its managerial work force to meet the technological demands of the future. The Airway Science Program has as a purpose the training of aviation professionals for industry as well as for the Federal Aviation Administration ("Careers," 1986).

The Federal Aviation Administration has delegated many aspects of the Airway Science Program to the University Aviation Association (Schukert, 1983, p. IV). The University Aviation Association (UAA) is a membership organization composed of colleges and universities which have aviation educational programs. At the present time, UAA member institutions number 81 ("UAA Membership List," 1988). Of these 81 institutions of higher learning, 32 are recognized as participants in the Airway Science Program (University Aviation Association [UAA], 1989, "AWS"). These recognized institutions must adopt a rigid curriculum which has been developed by the Federal Aviation Administration and approved by the UAA.

The Federal Aviation Administration has pledged to support airway science education through the hiring of up to 500 graduates a year ("Careers," 1986, p. 4). The program was developed in 1983 and offered by 13 participating institutions at that time. The airway science core curriculum consists of 85 credit hours of general studies, math sciences, computer science, management, and aviation.

In the areas of concentration, a student must select one of the five specialized options: (1) Airway Science Management (to train students for air traffic control, air carrier management, airport management, and general aviation operations management); (2) Airway Computer Science (to train students for careers in flight navigation, communications, information processing, and as an FAA computer specialist); (3) Aircraft Systems Management (to train aviation safety inspectors for the FAA and also professional pilots and flight operations managers); (4) Airway Electronic Systems (for troubleshooting, maintenance, testing, development, and FAA electronics technicians); and (5) Aviation Maintenance Management (to train maintenance, troubleshooting, and FAA Aviation Safety Inspectors). ("Airway Science Curriculum")

The FAA has provided grants to the UAA for the purpose of assisting the development of the airway science curriculum in aviation institutions which choose to participate. Grants were given to the University Aviation Association by the

Federal Aviation Administration to assist in the cost of designing the implementation procedures for these programs.

Presently, there are 32 recognized Airway Science institutions. The primary attraction for an institution to participate in the Airway Science Program is the pledge by the FAA to hire graduates from these recognized programs and to provide financial assistance in the form of grants to qualifying institutions ("Airway Science Grant"). The Airway Science Program is rigid and insensitive to the academic requirements of the participating institutions. This has created much difficulty in implementing the program and has forbade the implementation at some institutions.

The Federal Aviation Administration hires non-college educated persons for the same entry-level jobs which are sought by Airway Science graduates. In addition, the FAA hires graduates from "look alike" programs. These programs are similar to the Airway Science Program, yet they do not participate with the University Aviation Association and the Federal Aviation Administration in their guidelines to be a recognized Airway Science Program (Clough, 1988). Therefore, this appearance of a lack of support for the Airway Science Program may present a negative connotation to the participating institutions.

The failure to reach hiring goals has been questioned in that the Federal Aviation Administration has annually increased its hiring for air traffic control positions ("FAA Intensifies," 1988, p. 42). An air traffic controller does not have to go through the Airway Science Program, nor has hiring preference been given to Airway Science graduates. Any person may apply to become an air traffic controller. The applicants go through an evaluation and testing process before being invited to air traffic control school. Upon the successful completion of this program, they become certified air traffic controllers.

Evaluations of the Airway Science Program developed by the FAA seldom have considered the needs, ideas, or opinions of the program coordinators at member institutions. There appears to be a possibility that the delegation of program implementation through the University Aviation Association has put a barrier between the Federal Aviation Administration and the participating institutions. The UAA acts as an intermediary conveying data from participating recognized institutions through themselves to the FAA. These data which are reported by the UAA are basically quantitative and do not contribute subjective information (Gannon, 1989).

STATEMENT OF THE PROBLEM

The Airway Science Program was initiated to meet a perceived need to provide college educated and technically prepared

personnel for employment by the Federal Aviation Administration. The expectation was that a significant number of program graduates would be employed each year by the Federal Aviation Administration. The Airway Science Program has not functioned, so far, as it was expected to in making an important contribution to meeting the personnel needs of the Federal Aviation Administration (Clough, 1988).

The problem to be examined in this study may be stated specifically as follows: Why has the Airway Science Program failed to meet the work force goals for which it was established? Furthermore, it is important to determine if the program will be able to meet these work force goals in the future. Do changes need to be made in the program to allow it to function as was expected? The information which will be collected and analyzed in this study will be used to attempt to answer these questions.

PURPOSE OF THE STUDY

The purpose of this study is to collect and analyze information which can be used in examining the reasons for the failure, thus far, of the Airway Science Program to function as was anticipated. Subjective information about the Airway Science Program as viewed by participating institutions is not available. This is the major type of information which is to be gathered through this study. Each recognized institution has a designated program coordinator who is responsible for the implementation of the Airway Science Program at his or her respective institution (Gannon, 1989). These program coordinators can offer insight into whether or not the Airway Science Program is achieving its objectives. They will also be able to evaluate the current status of program implementation and future needs.

Data should be gathered to gain insight into the needed support by the FAA and UAA for the member institutions. Data concerning students and graduates of the program and other useful information needs to be assembled and summarized to relate the accomplishments of the program.

This study attempts to gain insight from the program coordinators in participating institutions about the progress made in the five years since the program was initiated. Recommendations for improvements which will allow the program to prosper in the next five years and thereafter will be sought.

The information gathered through this study will allow the FAA and the University Aviation Association to better understand the needs of program providers and users. Such information will also be provided to the aviation industry at large on its future prospects for trained aviation professionals. Students will have information available to

aid in selecting a program which best suits their needs and aspirations. The identification of any problems encountered during the implementation of the Airway Science Program will certainly be useful to all participants.

The current status of the Airway Science Program needs to be determined before any insight toward its effectiveness or future prospects can be gained. The collection of these data will allow recommendations to be made on how this program may prove to be more useful in the future. The data collected through this study will allow the reaching of tentative conclusions about ways in which to improve the implementation of the Airway Science Program to meet the Federal Aviation Administration's work force needs.

BACKGROUND LITERATURE

The FAA Airway Science Program was first made public on March 18, 1983, through volume 48, number 54, of the Federal Register. The program was officially titled "Airway Science Curriculum Demonstration Project." The original notice stated that the purpose of the project

> ... is to compare the performance, job attitudes, and perceived potential for supervisory positions of individuals recruited for several of FAA's technical occupations who have an aviation-related college-level education, or its equivalent, with individuals recruited for the same occupations through traditional methods.

This program was in response to the Federal Aviation Administration's perception of what it called the "... great socio-technological challenge for the 1980's and beyond." ("Proposed," p. 11672)

The program's development came soon after the firing of 12,000 striking air traffic controllers by President Ronald Reagan ("Airway Science Curriculum: Approval"). The work force of the Federal Aviation Administration is composed primarily of persons with technical occupations and high school educational backgrounds. The FAA's purpose for the Airway Science Program is to broaden the base of knowledge of its supervisory and managerial work force ("Airway Science Curriculum: Approval"). This work force must be readily adaptable to the increasing technical and automated environments being developed within the FAA at this time. This is a major undertaking in that the upgrading of this work force will require the attrition of over 45,000 individuals ("Proposed").

The objectives of this program were to provide for: (1) the recruitment/hiring of individuals who have completed or have the equivalent of a model college-level curriculum of general studies, mathematics, science and technology, management, and aviation courses; (2) the evaluation of the concept that individuals with this background recruited for FAA occupations are better able to perform the functions of the job than individuals recruited through existing methods. If this were the case, then that background could be substituted for general and specialized experience in hiring at the GS-7 level for specific FAA occupations; (3) the assessment of the performance, job attitudes, and potential of airway science individuals versus those of individuals employed by current procedures; and (4) the determination of the impact of this program on the employment in career professions of women and minority candidates ("Airway Science Curriculum: Approval"). The timing of this study allows the comparison of data which were gathered by the FAA to report on the original five-year demonstration project. These data can then be compared to the perspectives of the program coordinators which will be gathered through this study. The hiring estimates throughout the five-year demonstration project were as follows:

TABLE 1. ESTIMATE OF FAA AIRWAY SCIENCE HIRES

	1984	1985	1986	1987	1988
Air traffic controller	70	215	355	355	355
Electronics technician	25	72	122	122	122
Aviation safety inspector . .	4	10	18	18	18
Computer science	1	3	5	5	5
Total	100	300	500	500	500

("Airway Science Curriculum," p. 32495)

The Federal Aviation Administration contracted with the UAA to conduct the implementation of the Airway Science Program with the colleges and universities which chose to participate ("Airway Science Curriculum Proposal"). The FAA chose to use the University Aviation Association as an intermediary with participating institutions. The UAA then became responsible for assuring that the FAA guidelines for the Airway Science Program would be carried out. Application to participate in

the Airway Science Program is made to the UAA after evaluation of application documents from interested colleges and universities. The UAA then transfers required documentation to the FAA, requesting that a particular institution be recognized as a participant in the Airway Science Program ("Airway Science Curriculum Proposal"). Prior to final recommendation by the UAA, a visit is made to the prospective institution to assure that all requirements have been met and that facilities and faculty are satisfactory ("Site"). Airway science member institutions coordinate all communication on the Airway Science Program through the UAA ("Airway Science Curriculum Proposal").

The University Aviation Association Airway Science Curriculum Committee consists of 15 representatives elected from recognized airway science institutions. Member institutions vary in size from university wide enrollments of 550 to 36,163. With the UAA acting as an intermediary, it is unlikely that the views of all member institutions are addressed by the Airway Science Curriculum Committee, the UAA at large, and then made known to the Airway Science Director at the FAA ("Airway Science Curriculum Proposal").

Presently, there are 32 recognized institutions participating in this program (UAA, 1989, "AWS"). Some institutions have all five airway science options available, while others may have just one airway science option (UAA, 1989, "AWS"). Options available depend on the size of the institution, the technological ability of the institution to provide the appropriate educational training, and the financial resources of the institution.

Current participation in the Airway Science Program may be lessened by the FAA's hiring practices. The FAA continues to hire persons who have only high school educations or other demonstrated professional experience for job categories and levels for which airway science graduates are recruited ("FAA Intensifies"). Little incentive is given to the potential employee to endure a highly structured, quantitative, scientific curriculum of study which would take five years to complete when one without five years of education could apply for and have equal opportunity to obtain the same position. This lack of incentive for a student to participate in the Airway Science Program shall be one of the measurements in the data collection of this study.

The Federal Aviation Administration is receiving considerable pressure from the public to increase the level of safety in air travel ("McArtor"). This has required the FAA to increase the hiring of air traffic controllers and to engage in substantial hiring of aviation operations and safety inspectors ("FAA Intensifies"). These are both options within the Airway Science Program. These work force needs by the FAA are much greater than those projected in 1983

("Proposed"). Therefore, more opportunity for the employment of airway science graduates exists now than was perceived when the program was originated. This increased employment by the FAA has been mandated by the public; funds were budgeted by the administration, and disbursed by Congress. This increased employment has been directly related to three job categories of the Airway Science Program. The other two job categories of the Airway Science Program will receive considerable shirt-tail effect.

The measurement of support of the Airway Science Program by the FAA can be viewed by its hiring of airway science graduates during the five-year demonstration project. If the Federal Aviation Administration has not hired the graduates it pledged, then an assumption of its lack of support for the program will generally be made by the participating institutions. The Airway Science Program which was developed by the Federal Aviation Administration is not solely intended to provide graduates with FAA careers, but it is also intended to provide a pool of qualified managers for the entire aviation industry ("Careers," 1986).

RESEARCH

The goal of this research was to collect valuable new opinions and perceptions about the Airway Science Program from program coordinators which would aid in the understanding of whether or not the Airway Science Program will have a role in meeting Federal Aviation Administration work force requirements. Discovery of the needs, ideas, and opinions of member program coordinators can add insight into how the program can achieve maximum potential. Through this, an evaluation of the current status of the program will allow a measure of effectiveness to date. In addition to the primary opinion data, demographic data were collected to provide a basis of supportive, descriptive information which would increase the ability of the reader to understand the environment from which data were collected. Both subjective and descriptive data were collected through a structured telephone interview. The interview questionnaire utilized series of open-ended questions which allowed the participants opportunity to discuss their evaluations of the Airway Science Program.

The target group of respondents was the Airway Science program coordinators at each of the 32 institutions recognized by the Federal Aviation Administration as authorized Airway Science colleges and universities. Multiple attempts were made to reach the program coordinator at each authorized institution. The following Table presents a listing of the 32 authorized and participating institutions at the time this study was initiated. A listing of the

Airway Science Program options offered at each institution is also given in the Table. The total number of offerings in each Airway Science option is also given.

TABLE 2. AIRWAY SCIENCE RECOGNIZED INSTITUTIONS

Institution	Airway Science Options MGT[a]	CSC[b]	SYS[c]	ELE[d]	MNT[e]
ARIZONA STATE UNIVERSITY Tempe, AZ 32,253*	X		X		
AUBURN UNIVERSITY Auburn, AL 18,280	X		X		
BRIDGEWATER STATE COLLEGE Bridgewater, MA 7,189	X		X		
CENTRAL MISSOURI STATE UNIV. Warrensburg, MO 10,109				X	
CENTRAL WASHINGTON UNIVERSITY Ellensburg, WA 6,775	X		X	X	X
DANIEL WEBSTER COLLEGE Nashua, NH 550	X	X			
DELAWARE STATE COLLEGE Dover, DE 2,153	X		X		
DELTA STATE UNIVERSITY Cleveland, MS 2,289	X		X		
DOWLING COLLEGE Oakdale, NY 4,036	X	X	X		
EMBRY-RIDDLE AERONAUTICAL UNIV. Daytona Beach, FL 6,816		X	X		X
FLORIDA INSTITUTE OF TECHNOLOGY Melbourne, FL 6,497	X		X		
FLORIDA MEMORIAL COLLEGE Miami, FL 1,951	X	X			
HAMPTON UNIVERSITY Hampton, VA 3,230	X	X		X	
INTERAMERICAN UNIV. OF PUERTO RICO Hato Rey, PR 36,163	X	X		X	
JACKSON STATE UNIVERSITY Jackson, MS 6,777				X	
KEARNEY STATE COLLEGE Kearney, NE 9,094	X	X			
KENT STATE UNIVERSITY Stow, OH 22,753	X	X	X	X	X
METROPOLITAN STATE UNIVERSITY Denver, CO 10,457			X		X
MIDDLE TENNESSEE STATE UNIV. Murfressboro, TN 13,173	X	X	X	X	X

TABLE 2. Continued

Institution	Airway Science Options MGT[a]	CSC[b]	SYS[c]	ELE[d]	MNT[e]
NATIONAL UNIVERSITY San Diego, CA 10,157	X	X	X	X	X
UNIVERSITY OF NORTH DAKOTA Grand Forks, ND 11,658	X	X	X	X	X
NORTHEAST LOUISIANA UNIVERSITY Monroe, LA 9,875	X	X	X		
OHIO STATE UNIVERSITY Columbus, OH 33,637	X	X	X	X	
OHIO UNIVERSITY Athens, OH 1,277			X		
PARKS COLLEGE Cahokia, IL 1,117	X		X	X	X
PURDUE UNIVERSITY West Lafayette, IN 7,300	X				
ST. FRANCIS COLLEGE Brooklyn, NY 610	X				
SAN JOSE STATE UNIVERSITY San Jose, CA 20,047	X				
SOUTHERN ILLINOIS UNIVERSITY Carbondale, IL 24,227	X	X	X	X	X
SUFFOLK UNIVERSITY Boston, MA 5,444		X		X	
TEXAS SOUTHERN UNIVERSITY Houston, TX 6,634	X	X			
UTAH STATE UNIVERSITY Logan, UT 12,132				X	X
TOTAL.....	25	16	19	14	10

[a]MGT - Airway Science Management.
[b]CSC - Airway Computer Science.
[c]SYS - Aircraft Systems Management.
[d]ELE - Airway Electronic Systems.
[e]MNT - Aviation Maintenance Management.

* Enrollment according to Patterson's American Education, 1989.

Airway Science Program institutions vary in size of enrollment from 550 to 36,163. They are located throughout the United States. There is no geographical apportionment involved in the recognition process. The response group consisted of 20 of the 32 Airway Science Program institutions for a 63% rate of participation. The 63% response rate

exceeded the proposed goal of 55% and represented a wide diversity of colleges and universities.

DEMOGRAPHIC DATA

The interview instrument contained five demographic questions which were utilized to provide a basis for understanding the variety of institutions in the response group. Responding institutions represented all five Airway Science Program options. As can be seen from information in Table 3, some program options are more common than others in the respondent group.

TABLE 3. RESPONDENT GROUP AIRWAY SCIENCE OFFERINGS

Airway Science Program Option	Respondent Group
Airway Science Management	16
Airway Computer Science	9
Aircraft Systems Management	12
Airway Electronic Systems	8
Aviation Maintenance Management	6

The Airway Science Management option was predominant in the response group. This option is also more frequent in the total group of Airway Science options (see Table 2). Second in frequency is the Aircraft Systems Management Option. This is the flight curriculum. Several institutions reported utilizing outside vendors (Fixed Base Operators) to alleviate the overhead costs of aircraft.

All Airway Science Program institutions award a Bachelor's degree upon completion of the program. Of the twenty respondents, four reported having Master's level offerings in Aviation and one had a Master's program pending approval. No institutions offered doctoral degrees in aviation aside from aeronautical engineering. However, several mentioned participatory doctoral programs with other departments such as higher education and business.

The Airway Science Program was initiated in 1983. The respondent group included institutions which were approved in 1983 through 1988. The average length of participation of the twenty respondents was 4.1 years with a range of 1 to 6 years. This figure is useful in representing the maturity of the response group. Representation from institutions recognized in the original year of the program and those recognized in the past year, added a diversity of response.

The range of student enrollments in Airway Science Programs was from 5 to 600 for a mean of 104.7. The range of overall enrollment in Aviation at responding institutions was 5 to 1200 for an mean of 369.5. Of the approximately 7,390 aviation students, 2,094 were participating in Airway Science Programs. Twenty-eight percent of all aviation students are enrolled in Airway Science Programs. Some Airway Science institutions do not have other aviation offerings; in those cases, all students are enrolled in the Airway Science Program.

All respondents project growth potential throughout the next two years. Growth projections ranged from little to a 100% increase over the next two years. Five responding institutions reported that administrative caps had been placed on enrollment. One of these institutions reported that it had 600 freshman applicants for 35 openings. Another institution is only allowing new students into the non-flying aviation management curriculum. Information in Table 4 shows the projected growth over the next two years.

TABLE 4. PROJECTED INCREASE IN ENROLLMENTS NEXT TWO YEARS

Expected Growth Reported	Frequency
100%	4
50	3
30	1
25	1
20	3
10	2
Little	1
*Capacity	5

*Capacity = Program is at maximum allowed capacity and therefore cannot experience growth.

Perhaps the most significant demographic finding is that of known graduates who have been hired by the Federal Aviation Administration. The cumulative response by the program coordinators to the question "How many Airway Science Program graduates from your program (that you know of) have been hired by the Federal Aviation Administration?" was 31. An estimated 1000 Airway Science students have graduated. Much concern was expressed by the respondents to the low number of graduates who have been hired by the Federal Aviation Administration. These concerns are expressed in the subjective response section of this Chapter.

The highlights of the demographic data show that Airway Science Management is the most frequently occurring curriculum option. The response group varies in length of participation from 1 to 6 years (4.1 years average), and 28% of students enrolled in aviation programs are participating in the Airway Science Program. Also of interest is the fact that all institutions were reporting substantial growth opportunities. However, the most significant finding of the demographic section was the fact that the program coordinators know of only 31 graduates hired by the Federal Aviation Administration. This information will provide a point of reference for the presentation of the remaining findings.

RESEARCH RESULTS

The instrument utilized to gather data was comprehensive and required a generous time investment of up to thirty minutes on the part of the respondents. Therefore, a series of yes/no and scaled rating items was utilized in order to examine the subjective opinions of the program coordinators. Several of the yes/no questions allowed for a "why" or "why not" follow-up. The follow-ups which received a reply will be reported in narrative form following a table of the yes/no and scaled responses. Table 5 provides a listing of the yes/no questions and a cumulate of respondent replies.

TABLE 5. YES/NO QUESTION RESPONSES

Question	Yes	No	No Reply
Do you find that students prefer other aviation academic programs which you may offer over the Airway Science Programs?	15	5	0
Do you offer clearly parallel programs?	16	4	0
Do you feel that the Airway Science curriculum is appropriate to overall existing job markets?	16	4	0
To fulfill work force requirements should the FAA be allowed to hire graduates from look-a-like programs for Airway Science Program jobs?	14	5	1
Do you have any scholarship programs exclusively for aviation students?	14	6	0

TABLE 5. Continued

Question	Yes	No	No Reply
Are you having difficulty in attracting new students for the Airway Science Program?	8	11	1
Is this true of your other academic programs?	0	19	1
Do you receive grants from the FAA?	9	11	0
Do you anticipate grants in the forthcoming year?	13	7	0
Are FAA grants important to the existence of your aviation program?	12	8	0
Do you plan to continue participation in the Airway Science Program?	19	1	0
Is the FAA fulfilling its obligations in support of the member institutions?	11	9	0
Is the UAA fulfilling its obligations in support of member institutions?	16	3	1
Would you support having summer internships for Airway Science Program students at the FAA?	19	0	1
Do you see the need for a changing role in the Airway Science Program for the FAA?	9	10	1
Do you see the need for a changing role in the Airway Science Program for the UAA?	6	13	1

Table 6 lists the responses to the questions which asked the respondent to rate his or her opinion of a particular item.

TABLE 6. RATING RESPONSES

Question	Average Response 5Pt.Scale
On a scale of 1-5 with 5 being the most effective, how do you perceive the overall effectiveness of the Airway Science Program in meeting FAA work force requirements?	3.1
On a scale of 1 to 5, with 5 being the most adequate, do you feel that the Airway Science curriculum of courses is appropriate to the mission of the program?	3.8
On a scale of 1 to 5, is the FAA fulfilling its obligations in support of the member institutions?	3.4
On a scale of 1 to 5, is the UAA fulfilling its obligations in support of member institutions?	4.3
On a scale of 1 to 5, rate your feelings in regard to the UAA establishing and requiring follow-up accreditation visits?	3.8
On a scale of 1 to 5, rate the overall attitudes of your colleagues in higher education toward the Airway Science Program?	3.1
On a scale of 1 to 5, how do you feel about the FAA's plan to modify the Airway Science curriculum?	4.6

Significant findings also resulted from the use of open-ended and follow-up explanation questions. These items provided the opportunity for the program coordinators to qualify many of their yes\no and scaled rating responses. There was also an opportunity to communicate criticism and praise toward the program. Consequently, a complete summary of the program coordinators' perceptions of the role of the Airway Science Program to meet Federal Aviation Administration work force needs could be identified.

Responses to the question concerning why students would prefer other aviation academic programs to the Airway Science

Program were consistently in agreement that the Airway Science Program's curriculum was too rigid. The common problem reported was that there was no flexibility to adapt the curriculum to each institution's standards for general education. This resulted in the Airway Science Program being a 4 1/2 to 5 year program. Also cited were the rigid technical requirements of the program in physics, chemistry, and math. Other curricula criticisms included the inability to have a minor option, failure to allow the institutions input in curricula design, and the perception by students that the Airway Science Program is only to prepare one for employment by the Federal Aviation Administration.

These criticisms were repeated as responses to why institutions are having difficulty in attracting new students for the Airway Science Program while not experiencing difficulty in attracting students to other aviation academic programs. Curriculum inflexibility was also the predominant response when program coordinators were asked about their first concern in regard to the Airway Science Program. The program coordinators also cite this as the primary reason for changing the roles played by the Federal Aviation Administration and University Aviation Association. They commonly expressed a need for the institutions to have a greater role in determining the curriculum. A concern for upholding institutional academic integrity was expressed.

This perceived rigid curriculum also inhibited the motivation of students to participate in the Airway Science Program. Furthermore, a primary motivation for the students to participate in the program was the potential of immediate placement with the Federal Aviation Administration upon completion of the program. According to a majority of the respondents, the Federal Aviation Administration has failed to support the program through the hiring of graduates. This and a feeling of disproportionate grant funding was cited as the primary areas where the Federal Aviation Administration was perceived as not supporting its obligations to the member institutions and the Airway Science Program as a whole. However, 19 of the 20 respondents reported that they plan to continue participation in the Airway Science Program. When asked why, all responded that they had hopes the support would be increased through hiring and funding.

A majority of the program coordinators replied that even though hiring of Airway Science Program graduates has been weak, they felt that the Federal Aviation Administration should be allowed to hire graduates from look-a-like programs for Airway Science Program jobs. Overwhelming work force requirements by the Federal Aviation Administration were cited as the justification. However, some resentment was apparent in response to the Federal Aviation Administration's hiring of non-college graduates for Airway Science Program job categories.

The respondents expressed a consensus of opinion that the Airway Science Program curriculum is appropriate to overall existing job markets. However, they were experiencing difficulty in communicating this to potential students for the program. They reported that it was difficult to market the Airway Science Program because added rewards for additional effort and expense are not readily apparent. The respondents reported that students are not able to see benefits of the Airway Science Program over parallel programs offered in their own institutions. Placement in business and industry was not reported to be enhanced through completion of the Airway Science Program.

The role of the University Aviation Association in administering the Airway Science Program was ranked significantly more favorable than that of the Federal Aviation Administration. Respondents perceived a concerned effort by the University Aviation Association in support of the participating institutions. All program coordinators were somewhat favorable towards the University Aviation Association response to curriculum concerns. Efforts are being undertaken to provide relief for this significant issue. However, some feel that it is "too little, too late" and will not benefit existing programs without a nearly complete program restructuring process on the part of each institution. Another criticism of the University Aviation Association was the opinion that the Curriculum Committee of that organization is not representative of the diversity of institutions which are participating in the Airway Science Program. Also criticized were the long terms which committee members serve. Some feel that members' interests would be better served through shorter terms and more representation.

DISCUSSION OF RESULTS

Significant subjective findings include common recurring perspectives of the program as expressed by the program coordinators. They include recommendations that both the Federal Aviation Administration and University Aviation Association become more open-minded toward the needs of the participating institutions. Also, more responsibility for curriculum design should be given to the institutions. Efforts which are being made in curricula restructuring are viewed with skepticism. The curriculum is felt to be a secondary issue which has been given a primary focus.

The primary issue which should be addressed, according to many of the respondents, is the failure to provide the promised number of jobs to Airway Science Program graduates during a time when the Federal Aviation Administration is making thousands of new hires. Secondly, it is perceived that the Federal Aviation Administration is not funding the program adequately with grants to participating institutions.

While significant grants were reported from the respondent group, a total of $14.558 million, they were not considered to have been equitably distributed.

This study has resulted in many diverse findings. Program coordinators perceive the Airway Science Program to be a very good concept to help meet Federal Aviation Administration work force needs. This was the predominant feedback throughout most interviews. Information in Table 6 shows that the respondents rate the overall effectiveness of the Airway Science Program 3.1 on a 5.0 scale. This rating resulted in an above average measure on the scale. In applying this finding to the subjective opinions expressed by the respondents it was apparent that they perceived the program to be of significant value to the field of aviation. However, difficulties in agreeing how the program should be implemented, problems with the current status of implementation, and unfulfilled expectations have resulted in preventing this rating from being higher.

A noteworthy amount of criticism was made about the curriculum of the Airway Science Program. However, the appropriateness of the curriculum was measured at 3.8 on a 5.0 scale. Through comments recorded throughout this study, this high rating could be attributed to the fact that the program coordinators, as scholars, liked the demanding technical curriculum. Yet, as administrators facing rigorous program reviews in an era of academic accountability, they need a less demanding curriculum to attract and retain more students within this degree program. It is interesting to note from the data presented in Table 6, that respondents rated their colleagues' perceptions of the Airway Science Program to be equal to their own 3.1. Additionally, from the information measured in Table 6, it was found that the program coordinators overwhelmingly support the Federal Aviation Administration's plan to modify the Airway Science Program curriculum to allow more flexibility, by rating it 4.6 on the 5.0 scale.

Comparison was made between the Federal Aviation Administration and the University Aviation Association in how the program coordinators perceived each organization's role in fulfilling obligations to member institutions. The Federal Aviation Administration was rated at an average of 3.4 while the University Aviation Association was rated at 4.3 on the 5.0 scale. There are several explanations why this disparity may exist. The respondents are members of the University Aviation Association. Hence, there is a more collegial atmosphere between them and the University Aviation Association. They are able to participate in many of the decisions which are made by the University Aviation Association, whereas, the Federal Aviation Administration is a bureaucratic government agency. Respondents were not

without praise or criticism for each. Generally, they commented that both had done well given the circumstances. The consensus was that more flexibility should be given to the institutions.

Highlights of the findings reported in Table 5 include the fact that 16 Airway Science Program institutions offer clearly parallel degree programs to the Airway Science Program. This indicates that the responding institutions feel that they can design programs better suited to institutional needs. Also of significance is the fact that 19 respondents report no difficulty in attracting students for parallel programs. Eight respondents reported difficulty in attracting students to the Airway Science Program. It should also be noted that in some Airway Science Program institutions, all aviation students are in Airway Science Programs. There is no parallel program.

Popularity of aviation programs in higher education is easily identified from information presented in Table 4. All institutions reported growth if the programs were not limited by capacity. Growth projections for the forthcoming two years range from 100% to a minimum of 10% with one reporting "little growth." This popularity was further confirmed by the fact that few institutions reported any type of marketing or promotional activities to recruit students.

Initially, the most attractive feature of a college or university's participation in the Airway Science Program was the potential of receiving grants from the Federal Aviation Administration to fund the program. Nine respondents reported receiving grants totalling $14.558 million. Revealing the specific range of the grant awards would compromise the confidentiality of this study. Criticisms of the grant program included comments that awards were not being assigned proportionately among participants and that political maneuvering had been used to obtain grants. Thirteen respondents reported anticipation of grants in the forthcoming year. Twelve consider future grants vital to continuing their aviation programs.

The final research objective was to report the opinions of the program coordinators on how to make the program more effective. Information in Table 7 summarizes the responses to this question.

TABLE 7. RESPONDENTS' RECOMMENDATIONS TO INCREASE PROGRAM EFFECTIVENESS

Theme	Number of Responses
Federal Aviation Administration should hire more Airway Science Program graduates.	10
Curriculum should be more responsive to institutional needs.	8
Industry involvement should be promoted.	5
Federal Aviation Administration should support the program with increased and proportionate grant funding.	4

These recommendations coincide with criticisms which the program coordinators expressed throughout the interview process. The consensus is that the Federal Aviation Administration should act in the areas of supporting the program through hiring, funding, and addressing institutions' concerns about the curriculum. The respondents are extremely favorable about the Federal Aviation Administration's proposed plan to allow more flexibility in the curriculum. It is apparent that the response group does not feel that the Federal Aviation Administration has fulfilled all of its obligations to the Airway Science Program. Until these expectations are met, the Airway Science Program cannot achieve its maximum potential.

CONCLUSIONS

(1) The program coordinators feel that the Airway Science Program is extremely vital to the future of aviation in higher education. They also feel that it is valuable to the overall aviation industry. The program coordinators reported throughout the survey that the Federal Aviation Administration and the University Aviation Association need to work towards the final refinement of the Airway Science Program. They stated that this should include the pursuit of the original plan to utilize the Airway Science Program to meet stated work force needs of the Federal Aviation Administration.

(2) The most commonly recurring criticism of the Airway Science Program was the negligible hiring of Airway Science Program graduates by the Federal Aviation Administration. The mission of the Airway Science Program was to serve as a means of meeting a rapidly increasing Federal Aviation Administration work force need which has continued to accelerate throughout the duration of the program. Much concern was apparent from the failure of the Federal Aviation Administration to comply with this most important mission of the program. This criticism resulted from visible Federal Aviation Administration practices of hiring graduates from look-a-like parallel programs and especially from the hiring of individuals who have no college degree. Therefore, the Federal Aviation Administration must act on this issue before the perceptions of the program coordinators toward the Airway Science Program will improve.

(3) Curriculum restructuring was viewed with extreme favor by the respondent group. The program coordinators view the Airway Science Program curriculum with favor as scholars and visionaries of industry needs. However, they expressed concern about the inadequacies of the current curriculum to meet institutionally mandated requirements for general education. To meet the requirements, up to an additional two semesters of study are required of the students above the four-year mandated Airway Science Program.

(4) Parallel programs to the Airway Science Program are offered at 16 of the 20 respondent institutions. These look-a-like programs are being utilized to meet the needs of all parties. The FAA hires graduates from these programs to meet their work force needs. The Airway Science Institutions use them to attract students to their aviation departments. Students use them to fulfill their needs for a more responsive academic program. Hence, competition exists between these programs. A parallel program is clearly more popular than the Airway Science Program.

(5) The Airway Science Program is not responsive to the needs of students. Because of this it is difficult for the institutions to market the program and recruit students. The inflexibility of the curriculum, its costly added year of studies, and no significant chance of hiring by the Federal Aviation Administration gives students no above normal motivation to participate in the demanding Airway Science Program. In some regards, participating in the Airway Science Program is even potentially detrimental to students by putting them behind in entering industry for an additional year and for allowing no studies in the areas of business, professional education, or other complementary areas.

(6) It appears that institutions have established Airway Science Programs for the sake of competing for Airway Science Program grant funds. They have an Airway Science Program as

an add-on curriculum to serve this purpose. Institutions receiving grants were obviously not critical about the grant program. Those not receiving grants were critical of the grant program and voiced concerns of inequity and political ploy.

RECOMMENDATIONS

(1) The Federal Aviation Administration should conduct an internal study to evaluate whether or not to pursue continuation of the Airway Science Program with the original program goals. Alternatively, they may discover a need to reevaluate the goals and mission of the Airway Science Program.

(2) If the Federal Aviation Administration plans to continue the Airway Science Program, it should act immediately to meet the perceived weaknesses in the program. These weaknesses include hiring policies, the Airway Science Program grant system, and the curriculum flexibility needs.

(3) Both the Federal Aviation Administration and the University Aviation Association should develop a more participatory relationship with all program coordinators. They should also include other university administrators to assist in alleviating skepticism at the institutional level.

(4) The Airway Science Program should become more responsive to student needs. Further research should be conducted to evaluate the needs which students have in pursuing aviation programs in higher education.

(5) The Federal Aviation Administration should develop a more equitable grant program. The current grant program appears to have utilized Airway Science funding in an inequitable and unevenly distributed manner. The grant program needs a more defined goal which is either to serve exclusively the Airway Science Program or to serve overall aviation in higher education.

(6) Development of an internship/pre-hire program would allow pre-hire screening research to be conducted which would assist the FAA in determining the success of the Airway Science Program through developing a profile of preferred new hires. This would also be responsive to student's needs in that they could know within a year of graduation whether or not they would be hired by the FAA.

(7) A study of the overall aviation industry work force needs should be conducted. This could be utilized to develop the Airway Science Program into a course of study which would be beneficial to both the FAA and the aviation industry.

(8) A follow-up study of both graduate and currently enrolled Airway Science Program students should be made. This study should include as a primary objective the responsiveness of the Airway Science Program to meeting the needs of the students.

SUMMARY

This study has attempted to gain insight from the program coordinators in participating Airway Science institutions about the role of the Airway Science Program in meeting the air traffic control work force needs of the Federal Aviation Administration. Information gathered through this study should allow the Federal Aviation Administration, University Aviation Association, and other participants in the Airway Science Program to better understand the needs of the program providers and users. Such information should also be useful to the aviation industry at large for analysis of the impact of the Airway Science Program.

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